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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/655,596	09/06/2000	William F. Beausoleil	POU9-2000-0048-US1	9320

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EXAMINER

VU, TUAN A

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 12/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/655,596

Applicant(s)

BEAUSOLEIL ET AL.

Examiner

Tuan A Vu

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

1. This action is responsive to the Applicant's response filed 10/27/2003.

As indicated in Applicant's response, claims 1, 2 have been amended. Claims 1-4 are pending in the office action. Drawings submitted 10/27/03 are also considered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beausoliel et al., USPN: 5,551,013 (hereinafter Beausoliel) in view of Austin et al., USPN: 4,885,684 (hereinafter Austin); and further in view of Baker et al, USPN: 5,701,502 (hereinafter Baker).

As per claim 1, Beausoliel discloses a emulation engine comprised of a plurality of modules, a work station, and a bus for transferring data between the work station and said modules (Fig. 1,8), each of such modules including a plurality of processors and a module main memory accessible for data transfers during an emulation by each of such processors (e.g. col. 3, line 55-65; col. 5, lines 32-35; Fig. 3A-B), each of such processors having a control store to store a programmable sequence of emulation steps that define logic states for its processor (e.g. col. 4, lines 1-5; col. 6, lines 2-10; Fig. 9A, 11A), a method to allow data transfers between such module main memory unit and work station without interrupting an in-progress emulation (*non-blocking* - col. 8, lines 16-56; Fig. 5,7), comprising:

Art Unit: 2124

compiling said programmable sequence of emulation steps to include, in at least one step, a blocking code, when the step is read from the control store (e.g. col. 10, line 64 to col. 11, line 29; *Control Store* - col. 5, line 39 to col. 6, line 18), as a disable command between the plurality of said processors and main memory unit (e.g. *active, inactive* - col. 6, lines 14-27, 28-59; col. 6, line);

decoding said blocking code (e.g. col. 12, Table 1- Note: decoding is inherent to encoding instructions; Fig. 2a-b; Fig. 3a-b – Note: control word field/bit extraction is equivalent to decoding instructions code); and

transferring data between said work station and module main memory (e.g. *input to target system, emulation support facility*- col. 3, lines 28-37 ; *workstation* - Fig. 8 – Note: workstation is equivalent to host computer coordinating the support facilities functions operable on the processor modules, e.g. data or instructions transfer)

But Beausoliel does not specify a maintenance bus for transferring data between the workstation and processor modules. However, Beausoliel discloses latches and multiplexers to hold data flow to be used external to the execution of emulation logic; and path control bits multiplexing and changes for allowing concurrent data connection to support facilities (e.g. col. 3, lines 28-37; col. 8, lines 16-56; Fig. 1, 2A, 3A-B). Austin, in a network of processing units environment analogous to that of the emulating network of Beausoliel such as to use software program for deploying/supporting the functionality of the distributed data processing, discloses a maintenance bus for both the processing elements and for the supervisor unit (e.g. *EMB* and *TM bus* - col. 6, lines 4-26) for update storage operations, and other off-line functions. In view of the suggested teachings from Beausoliel's and Austin's from above, it would have been obvious for

Art Unit: 2124

one of ordinary skill in the art at the time the invention was made to provide a maintenance bus as taught by Austin to Beausoliel's concurrent support facilities operable within the emulation execution and operations by the processing units of Beausoliel's system because this would provide a specialized communicating channel, e.g. bus, to support the maintenance operations as suggested by Austin without affecting or interrupting the main data flow used by the processing units of the emulation by Beausoliel, thereby obviate bus/memory contention issues and enhance fault prevention, efficiency.

Nor does Beausoliel specify that in response to decoding blocking code, blocking transfers between the plurality of module processors and said module main memory units; and transferring data between the workstation and module memory units during such blocking from above. Austin, in the system for supporting and deploying distributed processors via software as mentioned above, discloses the use of maintenance bus to support the operations of the processing modules (re col. 6, lines 4-26); and teaches, via the use of LOS (Local Operating System), initialization, debug and error-related suspension operations within the emulating unit processors and/or recovery operations using such maintenance bus (e.g. col. 7, lines 51-63; *suspension, minimal overhead* - col. 12, line 47 to col. 13, line 7; *maintenance bus, alternate paths* - col. 9, lines 3-33, 42-50). The use of maintenance facilities to allow recovery of faulty modules and to prevent contention of memory access during such recovery or maintenance tasks is further evidenced by Baker. Baker, also in an environment to use software or microcode to integrate functions of a target system emulating processors based on a existing processor operating system to achieve fault-tolerant system analogous to that of Baker, discloses a maintenance bus and halting of process communications between the faulty processing unit and

Art Unit: 2124

the central operating system in response to decoding a maintenance interrupt (e.g. *lock-step* -col. 119, line 4-53) and thereby invalidating of non-valid data transfer to memory (e.g. col. 127, lines 3-23). Hence, in view of above-mentioned Beausoliel's teachings on support facilities and Austin's use of maintenance bus in conjunction with Baker's scheme to suspend servicing of slave processing units memory requests for synchronization tasks as a result of a maintenance interrupt detection as mentioned above, it would have been obvious for one of ordinary skill in the art at the time the invention was made to implement code instructions as taught by Beausoliel so that when a blocking code is decoded, the transferring of data between processors and their memory units is blocked so that the maintenance bus is utilized in order to allow data be transferred from the maintenance dedicated workstation onto the main memory unit just as suggested by Austin and by the recovery synchronization calls by Baker for the same reasons as mentioned above in the rejection of the maintenance bus limitation and also because this would avoid further contamination/incoherency of the processor memory when external data are written to their memory units, i.e. synchronization process as taught by Baker.

As per claim 2, Beausoliel does not specify the step of unblocking transfers between the module processors memory unit when such step is sequentially decoded next after a blocking code step. But in view of the combined teachings by Austin and Baker's teachings on suspending operations upon a failure detection (Austin: col. 7, lines 51-63; *suspension, minimal overhead* - col. 12, line 47 to col. 13, line 7; *maintenance bus, alternate paths* - col. 9, lines 3-33, 42-50; Baker: *lock-step* - col. 119, lines 12-24) as mentioned above, it would have also been obvious to add the step of unblocking after a decoded step of blocking has been completed to Beausoliel's repetitive emulation process because the motivation would be that once the

Art Unit: 2124

maintenance steps as suggested by Austin are completed, it would be necessary to resume the data transfer and communication between the processors and their memory unit or bus system in Beausoliel's system in order to proceed on with the rest of the emulation.

As per claim 3, Beausoliel discloses a repetitive cycle in decoding and emulating the program code (e.g. col. 12, lines 5-13) but fails to specify that the transferring of data step between module memory and workstation is repetitive. But in view of the rejection of such data transferring step as addressed in claim 1, the repetition of such data transfer would be inferred from the combined teachings by Beausoliel (repetitive emulation decoding) and Austin combined with Baker (maintenance bus, LOS, suspension and initialization operations) and the rejection as set forth above.

As per claim 4, Beausoliel discloses a repetitive cycle in decoding and emulating the program code (e.g. col. 12, lines 5-13) but fails to specify that the transferring of data step between modules memory units and workstation being followed by an unblocking step is repetitive. This limitation corresponds to the same limitation of claim 3 above; hence, in view of the combined teachings by Austin/Beausoliel/Baker and the rejection as set forth in claims 2, and 3 above, this limitation would have been obvious because of the rationale as set forth therein.

Response to Arguments

5. Applicant's arguments with respect to claims 1-4 have been considered but a new ground(s) of rejection is now established.

However, certain remarks made in the Applicants Remarks related to the prior art used are not persuasive and deserve some counter arguments.

Art Unit: 2124

(A) Applicants have submitted that Beausoliel 'does not teach or suggest anything relating to decoding blocking codes ... non-existent blocking codes cannot be decoded' (Appl. Rmks, pg. 4, last para). The current rejection has pointed out that program code has been compiled and executed in order to emulate the execution of the multi-processor array; and the mere fact of having a compiler and execution engine entails that instruction code is decoded. From the rejection, the bits being decoded and being used to allow whether or not memory operations are enabled are meeting what is interpreted as blocking code. Even the invention specifications describe code bits and decoding of such words (pg. 6, bottom para) for effecting the emulation program.

(B) Applicants have submitted that Austin does not teach or suggest decoding a blocking code and instructions to emulate a design of integrated circuits(Appl. Rmks, pg. 4, bottom, pg. 5, top and middle para). The analogy between Beausoliel and Austin's method is that both uses compiled code to execute multi-processing system using a central control processing unit or supervising unit and a bus to effect data and message transfer. What is not explicitly disclosed in Beausoliel has been provided by Austin, and that is the use of maintenance facilities (bus) to effect fault-prevention and error recovery of modules under execution. As a secondary reference, Austin is not supposed to meet each and every limitation already addressed by Beausoliel, the base reference. And since the combination of both yields the motivation to provide program code with instructions to invoke maintenance calls using maintenance bus, what is lacking in Beausoliel has been met by that combination with respect to the motivation as set forth in the rejection.

Art Unit: 2124

(C) Applicants have submitted that neither Beausoliel and Austin teach or suggest enabling transfer of external data ... without interrupting emulation in progress (Appl. Rmks, pg. 5, 3rd para). The rejection has pointed out how such data being transferred in Beausoliel's method teaches that such transfer is non-interruptive to the emulation process. Besides, the limitation as to provide data transfer between the main memory and maintenance facilities for maintenance and synchronization is now under the ambit of the new ground of rejection using Baker.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat No. 6,529,983 to Marshall et al., disclosing use of software semaphores to allow contention prevention .

U.S. Pat No. 4,701,845 to Andreassen et al., disclosing user's instructions to provide maintenance on bus contention.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for formal communications intended for entry)

or: (703) 746-8734 (for informal or draft communications, please label

“PROPOSED” or “DRAFT”)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA. , 22202. 4th Floor(Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan A Vu whose telephone number is (703)305-7207. The examiner can normally be reached on 8AM-4:30PM/Mon-Fri.

Art Unit: 2124

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (703)305-9662. The fax phone number for the organization where this application or proceeding is assigned is (703)746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

VAT
December 23, 2003

Kakali Chaki

**KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100**